

Mountain erosion over 10 yr, 10 k.y., and 10 m.y. time scales

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ABSTRACT

The authors used cosmogenic ^{10}Be to measure erosion rates over 10 k.y. time scales at 32 Idaho mountain catchments, ranging from small experimental watersheds (0.2 km²) to large river basins (35 000 km²).

These long-term sediment yields are, on average, 17 times higher than stream sediment fluxes measured over 10–84 yr, but are consistent with 10 m.y. erosion rates measured by apatite fission tracks. The results imply that conventional sediment-yield measurements - even those made over decades - can greatly underestimate long-term average rates of sediment delivery and thus overestimate the life spans of engineered reservoirs. The observations also suggest that sediment delivery from mountainous terrain is extremely episodic, sporadically subjecting mountain stream ecosystems to extensive disturbance.